ELECTRICAL SPECIFICATIONS

SECTION 16010
ELECTRICAL SYSTEMS DESCRIPTIONS

A. PROJECT INCLUDES
1. ELECTRICAL SYSTEMS FOR THE FOLLOWING APPLICATIONS: REFER TO INDIVIDUAL SPECIFICATION SECTIONS FOLLOWING FOR DETAILED REQUIREMENTS.

a. POWER AND DISTRIBUTION.
b. POWER CONNECTIONS FOR HVAC EQUIPMENT.

B. PRODUCTS
1. SYSTEMS, PRODUCTS, AND STANDARDS ARE LISTED IN INDIVIDUAL SPECIFICATION SECTIONS WHICH FOLLOW.

2. ALL MATERIALS, DEVICES, APPLIANCES, AND EQUIPMENT SHALL BE NEW AND LABEL LISTED BY AN APPROVED THIRD PARTY TESTING AGENCY APPROVED BY THIS STATE.

C. GENERAL PROJECT REQUIREMENTS
1. PROVIDE ALL WORK AND MATERIALS FOR THE INSTALLATION OF COMPLETE WIRING SYSTEMS AS SPECIFIED HEREIN AND SHOWN ON THE DRAWINGS.

2. ALL ELECTRICAL PERMITS AND INSPECTION FEES SHALL BE OBTAINED AND PAID FOR BY THE ELECTRICAL CONTRACTOR.

3. ELECTRICAL CONTRACTOR SHALL GUARANTEE ALL WORK AND MATERIALS FOR ONE YEAR EFFECTIVE THE DAY THE PROJECT IS ACCEPTED BY THE OWNER.

4. ALL ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH THE MOST RECENT ADOPTED VERSION OF THE NFPA, NATIONAL ELECTRICAL CODE (N.E.C.), AND ALL APPLICABLE LOCAL CODES.

5. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL CUTTING AND PATCHING FOR INSTALLATION OF NEW ELECTRICAL WORK AND REPAIR ANY DAMAGE DONE.

6. SHOP DRAWINGS AND CATALOG DATA SHALL BE SUBMITTED FOR NEW PANELBOARDS, DISCONNECT SWITCHES, WIRING DEVICES AND MISCELLANEOUS MATERIALS. QUANTITY OF SHOP DRAWINGS SUBMITTED SHALL BE A MINIMUM OF FOUR (4) COPIES EACH.

7. PROVIDE ENGRAVED PHENOLIC NAMEPLATES FOR NEW PANELBOARDS, WIRING TROUGHS AND DISCONNECT SWITCHES. LABELS SHALL BE WHITE LETTERS ON BLACK FIELD. NAMEPLATE SHALL INDICATE EQUIPMENT NAME, VOLTAGE AND CIRCUIT/FEEDER SERVING EQUIPMENT (WHERE APPLICABLE).

8. ELECTRICAL CONTRACTOR SHALL TEST ALL WIRING FOR CONTINUITY AND GROUNDS PRIOR TO WIRING BEING ENERGIZED. FAULTY WIRING SHALL BE REPLACED.

9. ELECTRICAL CONTRACTOR SHALL CONNECT ALL HVAC EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS (UNLESS OTHERWISE NOTED). CONTROL WIRING FOR EQUIPMENT NOT PROVIDED BY THE ELECTRICAL CONTRACTOR, SHALL BE PROVIDED BY THE RESPECTIVE CONTRACTOR. COORDINATE WITH EQUIPMENT SHOP DRAWINGS AND EQUIPMENT CONTRACTOR FOR DISCONNECT SWITCH, CONDUIT, WIRING REQUIREMENTS, FUSE AND BREAKER SIZES, AND VOLTAGE REQUIREMENTS. ALL FINAL CONNECTIONS TO JUNCTION BOXES SHALL BE BY THE ELECTRICAL CONTRACTOR.

10. EACH BIDDER SHALL VISIT THE JOB SITE PRIOR TO BIDDING TO FAMILIARIZE HIMSELF/HERSELF WITH EXISTING CONDITIONS. FAILURE TO VISIT SITE SHALL NOT EXCUSE CONTRACTOR FROM PERFORMING REQUIRED WORK, NOR SHALL IT BE AN ACCEPTABLE REASON FOR REQUESTING ADDITIONS TO THE CONTRACT.

11. THE EXISTING PORTIONS OF THIS FACILITY WILL REMAIN IN OPERATION DURING THIS CONSTRUCTION. ELECTRICAL CONTRACTOR SHALL CAUSE AS LITTLE DISRUPTION AS POSSIBLE TO THE FUNCTIONING OF THE FACILITY IN ORDER TO MAINTAIN THE COMFORT AND SAFETY OF THE OCCUPANTS.

12. THIS PROJECT INVOLVES SOME WORK ON EXISTING ELECTRICAL FACILITIES. EXISTING FEEDER, BRANCH CIRCUITS, COMMUNICATIONS, RACEWAYS, ETC. WHICH ARE DISRUPTED BY THIS PROJECT SHALL BE RE-ROUTED AND/OR RE-FED FROM A NEW SOURCE AS REQUIRED TO MAINTAIN THEM IN FULL AND PERMANENT SERVICE.

13. THIS PROJECT INVOLVES SOME DEMOLITION WORK. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER REMOVAL OF WIRING, RACEWAY, FIXTURES, OUTLETS, ETC. AS NECESSARY TO ACCOMPLISH THE DEMOLITION WORK.

14. IF APPLICABLE, PROVIDE MIN. 24" HORIZONTAL SEPARATION BETWEEN BOXES INSTALLED IN OPPOSITE SIDES OF THE SAME WALL AS REQUIRED BY N.E.C. ART. 300.21

15. IF APPLICABLE, FIRE-STOPPING OF PENETRATIONS IN RATED WALLS AND FLOORS SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE USING APPROVED ASSEMBLIES SUCH AS THE FOLLOWING:

CONDUIT PENETRATIONS OF 1, 2 OR 4 HOUR GYPBOARD WALLS – U.L. #W-L-1080.

CONDUIT PENETRATIONS OF 1 OR 2 HOUR CONCRETE WALLS OR FLOORS, OR BLOCK WALLS – U.L. #C-AJ-1044.

CONDUIT PENETRATIONS OF 4 HOUR CONCRETE WALLS OR FLOORS, OR BLOCK WALLS – U.L. #C-AJ-1044.

16. IF APPLICABLE, IN REQUIRED FIRE-RATED WALLS AND PARTITIONS, OPENINGS FOR INSTALLATION OF BOXES THAT ARE GREATER THAN 16 SQUARE INCHES SHALL BE PROTECTED AS REQUIRED BY A THIRD PARTY TESTING AGENCY APPROVED BY THIS STATE. COORDINATE CLOSELY WITH THE GENERAL CONTRACTOR TO INSURE THAT THE INTEGRITY OF THE RATING IS MAINTAINED

SECTION 16110
RACEWAYS AND BOXES

A. PROJECT INCLUDES
1. ELECTRICAL CONDUIT, TUBING, SURFACE RACEWAYS, BOXES, AND CABINETS FOR ELECTRICAL POWER AND SIGNAL DISTRIBUTION.

B. PRODUCTS
1. WIRING METHODS:
a. CONCEALED OR EXPOSED INDOOR WIRING: ZINC-COATED ELECTRICAL METALLIC TUBING FOR SIZES 1/2" THROUGH 4". INTERMEDIATE STEEL CONDUIT FOR SIZES LARGER THAN 4".
b. EXPOSED OUTDOOR WIRING: RIGID OR INTERMEDIATE STEEL CONDUIT.
c. CONCEALED OUTDOOR WIRING: INTERMEDIATE STEEL CONDUIT OR SCHEDULE 80 OR 40 PVC.
d. UNDERGROUND WIRING, SINGLE RUN: SCHEDULE 80 OR 40 PVC.
e. UNDERGROUND WIRING, GROUPED: SCHEDULE 80 OR 40 PVC.
f. CONNECTION TO EQUIPMENT: FLEXIBLE METAL CONDUIT, LIQUIDTIGHT AT EXTERIOR OR IN DAMP LOCATIONS.

2. FITTINGS FOR ELECTRICAL METALLIC TUBING SHALL BE HEXAGONAL, GALVANIZED STEEL, GLAND TYPE, COMPRESSION TYPE AND THREADLESS.

3. RACEWAY ACCESSORY MATERIALS:
a. CONDUIT BODIES: SHALL COMPLY WITH N.E.C. REQUIREMENTS.
b. SURFACE RACEWAYS, METALLIC: GALVANIZED STEEL, WITH SNAP-ON COVERS AND IVORY ENAMEL FINISH. SURFACE RACEWAY MAY ONLY BE USED WITH PRIOR, WRITTEN APPROVAL FROM OWNER AND ENGINEER.

4. BOXES AND FITTINGS:
a. CABINET BOXES: CODE GAUGE GALVANIZED SHEET METAL, NEMA 1 –INDOORS, NEMA 3R –OUTDOORS OR IN DAMP LOCATIONS.
b. PULL AND JUNCTION BOXES: CODE GAUGE GALVANIZED SHEET METAL, NEMA 1 –INDOORS, NEMA 3R –OUTDOORS OR IN DAMP LOCATIONS.
c. METAL OUTLET, DEVICE AND SMALL WIRING BOXES: SHALL COMPLY WITH UL 514A.

C. EXECUTION
1. PROPERLY SUPPORT ALL CONDUITS WITH STRAPS AND CLAMPS PER N.E.C. AND INTERNATIONAL BUILDING CODE. RUN ALL CONDUITS PARALLEL OR PERPENDICULAR TO BUILDING WALLS/SURFACES.

2. MINIMUM CONDUIT SIZE ABOVE SLAB/GRADE SHALL BE 1/2". MINIMUM CONDUIT SIZE IN OR BELOW FLOOR SLAB SHALL BE 3/4".

3. RACEWAY PENETRATIONS THROUGH FLOOR SLABS AND FIRE-RATED WALLS SHALL BE FILLED WITH NON-POROUS, NON-SHRINK GROUT SUFFICIENTLY TIGHT TO PREVENT THE TRANSFER OF SMOKE, FIRE, WATER, AND DUST. ROOF PENETRATIONS SHALL BE WITHIN THE EQUIPMENT CURB.

4. CONDUITS INSTALLED UNDERGROUND OR IN CONCRETE SHALL HAVE JOINTS MADE WATER-TIGHT BY USING A POLYTETRA-FLUOROETHYLENE TAPE. ALL METALLIC UNDERGROUND CONDUITS SHALL BE THOROUGHLY COATED WITH TWO COATS OF ASPHALTUM OR BITUMASTIC.

5. PROVIDE PULLWIRE IN ALL EMPTY CONDUITS.

SECTION 16120
WIRES AND CABLES

A. PROJECT INCLUDES
1. WIRES, CABLES, AND CONNECTORS FOR POWER, LIGHTING, SIGNAL, CONTROL AND RELATED SYSTEMS RATED 600 VOLTS AND LESS.

B. PRODUCTS
1. WIRE COMPONENTS:
a. CONDUCTORS FOR POWER AND LIGHTING CIRCUITS: SOLID CONDUCTORS FOR SIZES #14 AWG THROUGH #8 AWG, STRANDED CONDUCTORS FOR #6 AWG AND LARGER.
b. CONDUCTOR MATERIAL: COPPER.
c. INSULATION: THHN/THWN.
d. JACKETS: FACTORY-APPLIED NYLON OR PVC, COLOR CODED: "BLACK/RED/BLUE/WHITE" FOR "A", "B" AND "C" PHASES, NEUTRAL, RESPECTIVELY FOR 120/208-VOLT SYSTEM. "BROWN/ORANGE/YELLOW/LIGHT GRAY" FOR "A", "B" AND "C" PHASES, NEUTRAL, RESPECTIVELY FOR 277/480-VOLT SYSTEM.
e. BRANCH CIRCUIT CONDUCTORS: SHALL NOT BE SMALLER THAN #12 AWG. CONTROL WIRING MAY BE #14 AWG.
f. NEUTRAL CONDUCTORS: #10 AWG MINIMUM FOR ALL MULTIWIRE BRANCH CIRCUITS.
g. "MC" TYPE CABLE WITH INTEGRAL, GREEN, INSULATED GROUND CONDUCTOR, MAY BE UTILIZED TO SERVE BRANCH CIRCUITS.

2. CABLES:
a. PORTABLE CORD FOR FLEXIBLE PENDANT LEADS TO OUTLETS AND EQUIPMENT: UL TYPE S.
b. CONTROL/SIGNAL TRANSMISSION MEDIA: TWISTED PAIR TYPE.

3. CONNECTORS: UL LISTED SOLDERLESS METAL CONNECTORS WITH APPROPRIATE TEMPERATURE RATINGS.

SECTION 16140
WIRING DEVICES

A. PROJECT MAY INCLUDE
1. WIRING DEVICES FOR ELECTRICAL SERVICE.

B. PRODUCTS
1. WIRING DEVICES AND COMPONENTS:
a. RECEPTACLES: 20-AMP DUPLEX (HUBBELL #5362, OR APPROVED EQUIVALENT).
b. GROUND-FAULT INTERRUPTER (GFI) RECEPTACLES: FEED-THRU TYPE GROUND-FAULT CIRCUIT INTERRUPTER WITH INTEGRAL DUPLEX RECEPTACLES. (HUBBELL #GF-5362, OR APPROVED EQUIVALENT).
c. PLUGS AND PLUG CONNECTOR: AS SPECIFIED ON DRAWINGS.
d. SNAP SWITCHES: SINGLE-POLE, 20 AMPERE (HUBBELL #1221, OR APPROVED EQUIVALENT), THREE-WAY, 20 AMPERE (HUBBELL #1223, OR APPROVED EQUIVALENT).
e. WALL PLATES: SINGLE AND COMBINATION TYPES, MATCHING EXISTING BUILDING STANDARD, UNLESS OTHERWISE NOTED ON DRAWINGS.
f. TOOLOR OF ALL DEVICES AND COVERPLATES TO MATCH EXISTING BUILDING STANDARD, UNLESS OTHERWISE NOTED ON DRAWINGS.

C. EXECUTION
1. DUPLEX RECEPTACLES SHALL BE 20-AMP.

2. DEVICE/OUTLET BOXES SHALL NOT BE MOUNTED BACK-TO-BACK IN WALLS.

3. WEATHERPROOF COVERS SHALL PROTECT THE OUTLET WHILE IN USE, EQUIVALENT TO LEVITON #5997-DCL. COVERS SHALL BE EXTRA DEEP, CLEAR, IMPACT-RESISTANT THERMOPLASTIC WITH OUTLET MOUNTED IN HORIZONTAL ORIENTATION.

4. PROVIDE ALL OUTLETS WITH APPROPRIATE COVERPLATES.

SECTION 16400
SERVICE AND DISTRIBUTION

A. PROJECT MAY INCLUDE
1. ELECTRICAL SERVICE AND DISTRIBUTION INCLUDING GROUNDING, PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES AND DISCONNECT SWITCHES.

B. PRODUCTS
1. GROUNDING:
a. GROUNDING EQUIPMENT: COPPER CONDUCTORS, N.E.C. APPROVED CONNECTORS.
b. GROUNDING ELECTRODES: COPPER-CLAD STEEL GROUND RODS.
c. GROUNDING SYSTEM: SHALL COMPLY WITH N.E.C. ARTICLE 250.

2. PANELBOARDS:
a. PANELBOARDS: WITH OVERCURRENT PROTECTIVE DEVICES, DEAD-FRONT SAFETY ENCLOSURE SUITABLE FOR USE (20" WIDE MINIMUM WITH 4" WIRING GUTTERS AT TOP, SIDES, AND BOTTOM), COPPER BUS, MECHANICAL TYPE MAIN AND NEUTRAL LUGS.
b. PANELBOARD TYPE: LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARDS, BOLT ON CIRCUIT BREAKERS.
c. SERIES RATING IS NOT ALLOWED FOR ALL NEW PANELBOARDS, CIRCUIT BREAKERS AND DEVICES.
d. ACCEPTABLE MANUFACTURERS: SQUARE D, SIEMENS, G.E. OR CUTLER-HAMMER.

3. DISCONNECT SWITCHES:
a. HEAVY-DUTY TYPE.
b. NEMA 1 ENCLOSURE – INDOORS, NEMA 3R ENCLOSURE – OUTDOORS AND WET AREAS.
c. FUSED OR NON-FUSED AS INDICATED ON DRAWINGS.
d. FUSED SWITCHES SHALL HAVE REJECTION-TYPE FUSE CLIPS.
e. ALL DISCONNECTS SHALL BE HEAVY-DUTY RATED, AND SHALL HAVE A MECHANICAL INTERLOCK TO PREVENT THE DOOR FROM BEING OPENED, WITHOUT DEFEATING THE INTERLOCK. THE MECHANICAL INTERLOCK SHALL ALSO PREVENT ACTIVATING THE SWITCH WHEN THE DOOR IS OPEN. THE MECHANICAL INTERLOCK SHALL BE DEFEATABLE BY A SPECIAL TOOL, AND SHALL BE U.L. LISTED AS PART OF THE DISCONNECT.

4. OVERCURRENT PROTECTIVE DEVICES:
a. OVERCURRENT PROTECTIVE DEVICES: INTEGRAL TO PANELBOARDS.
b. FUSIBLE SWITCHES: RATING AS INDICATED ON DRAWINGS AND SUITABLE FOR USE.
c. MOLDED CASE CIRCUIT BREAKERS: BOLT-ON TYPE, AUTOMATIC THERMAL MAGNETIC TYPE CALIBRATED FOR 40-DEGREES C, OR AMBIENT COMPENSATION.
d. ACCEPTABLE MANUFACTURERS: SQUARE D, SIEMENS, G.E. OR CUTLER-HAMMER.

5. FUSES:
a. SIZES INDICATED ON DRAWINGS.
b. CLASS R-5, TIME DELAY, UNLESS OTHERWISE NOTED.
c. A SET OF 3 SPARE FUSES OF EACH SIZE AND TYPE SHALL BE FURNISHED TO THE OWNER.
d. ACCEPTABLE MANUFACTURERS: BUSSMAN, GOULD SHAWMUT OR LITTLE FUSE.

C. EXECUTION
1. ALL NEW MULTI-CIRCUIT HOMERUNS SHALL BE PROTECTED WITH A MULTI-POLE, SIMULTANEOUS-TRIP CIRCUIT BREAKER PER N.E.C. 210-4B.

2. ALL TERMINATION'S ON NEW ELECTRICAL GEAR/EQUIPMENT (i.e. PANELBOARDS, DISCONNECT SWITCHES, etc.) SHALL HAVE DUAL RATED 60-DEGREE / 75-DEGREE LUGS/TERMINALS.

END OF SPECIFICATIONS

ELECTRICAL SYMBOL SCHEDULE

SYMBOL	DESCRIPTION
GENERAL	
	CONDUIT RUN CONCEALED IN CEILING OR IN WALL.
	CONDUIT RUN CONCEALED IN FLOOR OR BELOW SLAB/GRADE.
	CONDUIT RUN EXPOSED ON SURFACE.
	CIRCUIT HOME RUN. NUMBER OF ARROWS INDICATES NUMBER OF CIRCUITS.
	120/208 VOLT DISTRIBUITION OR BRANCH CIRCUIT PANELBOARD.
	277/480 VOLT DISTRIBUTION OR BRANCH CIRCUIT PANELBOARD.
	FLUSH OR SURFACE-MOUNTED JUNCTION BOX.
T-1	TRANSFORMER. SIZE AS INDICATED ON DRAWINGS.
POWER	
30A/3P	NON-FUSED DISCONNECT SWITCH. SUBSCRIPT INDICATES AMPERAGE AND NUMBER OF POLES.
30A/3P/FPN	FUSED DISCONNECT SWITCH. SUBSCRIPT INDICATES AMPERAGE, NUMBER OF POLES; AND AMPERAGE OF FUSES. ("FPN" – PROVIDE FUSES SIZED PER EQUIPMENT NAMEPLATE)
1/4	FRACTIONAL HP, 120 VOLT, SINGLE PHASE MOTOR. IF SHOWN, NUMBER INDICATES HP RATING.
	INTEGRAL HP, THREE PHASE MOTOR, IF SHOWN, NUMERAL INSIDE SYMBOL INDICATES HP RATING.

APPENDIX B - ELECTRICAL SUMMARY
ELECTRICAL SYSTEMS AND EQUIPMENT

Provide a standard riser diagram. Provide a standard panelboard schedule description for each panelboard, which identifies different enduse loads

Lighting shedule

lamp type required in fixture — N.A.
number of lamps in fixture
ballast type used in fixture
total interior wattage specified vs. allowed — N.A.
total exterior wattage specified vs. allowed (Tradable) — N.A.
total exterior wattage specified vs. allowed (Non-Tradable) — N.A.

Equipment schedules with motors (not used for mechanical systems)

motor horsepower — N.A.
number of phases
minimum efficiency
motor type
# of poles

NO NEW LIGHT FIXTURES ADDED

Additional Prescriptive Compliance Requirements (Section 506)

☐ Reduced Lighting Power Density
percentage of improvement over Table 505.5.2 allowances: XX %
☐ On-Site Supply of Renewable Energy
☐ Automatic Daylighting Control System

DESIGNER STATEMENT:
To the best of my knowledge and belief, the design of this building complies with the electrical system and equipment requirements of International Energy Conservation Code

ELECTRICAL DRAWING INDEX

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WILLIAMS COUNTY INDOOR SPORTS COMPLEX
INDOOR 50-METER SWIMMING POOL
PADDOCK EVACUATOR FAN SYSTEM

ENGINEER'S SEAL

TIMOTHY A. PAYNE
LICENSED PROFESSIONAL ENGINEER
AGRICULTURE
No. 091165
STATE OF TENNESSEE

06/24/15

REV.	DATE	DESCRIPTION

DATE: 06/22/2015
PROJECT NO.: 15-055.00
TITLE: ELECTRICAL NOTES, SPECIFICATIONS AND SCHEDULES
DRAWING NO. E1